

## ABSTRACT OF THE DISCLOSURE

The present disclosure provides artificial heavy metal binding proteins termed  
5 chelons by the inventors. These chelons bind cadmium and/or mercuric ions with relatively  
high affinity. Also disclosed are coding sequences, recombinant DNA molecules and  
recombinant host cells comprising those recombinant DNA molecules for expression of the  
chelons proteins. In the recombinant host cells or transgenic plants, the chelons can be used  
10 to bind heavy metals taken up from contaminated soil, groundwater or irrigation water and  
to concentrate and sequester those ions. Recombinant enteric bacteria can be used within  
the gastrointestinal tracts of animals or humans exposed to toxic metal ions such as mercury  
and/or cadmium, where the chelon recombinantly expressed in chosen in accordance with  
the ion to be rededicated. Alternatively, the chelons can be immobilized to solid supports  
15 to bind and concentrate heavy metals from a contaminated aqueous medium including  
biological fluids.